Problem 73. Show that group isomorphism, denoted by $\approx$, is an equivalence relation.

Problem 74. Below is a list of 10 ten-digit numbers made up of only 2’s and 4’s. Some digits are visible to you, while others are not. Find a ten-digit number made of only 2’s and 4’s that is not on the list, and give a clear explanation as to why your answer is not on the list.

\[
\begin{align*}
n_1 &= x\ x\ x\ 2\ x\ 4\ x\ x\ x\ 4 \\
n_2 &= x\ x\ x\ 4\ x\ 2\ x\ 4\ x \\
n_3 &= x\ x\ x\ x\ x\ x\ 4\ x\ x \\
n_4 &= 4\ x\ 2\ x\ x\ x\ 2\ x\ x\ x \\
n_5 &= x\ 2\ x\ x\ 2\ x\ x\ x\ x \\
n_6 &= x\ x\ 4\ x\ 2\ x\ x\ x\ x \\
n_7 &= x\ x\ x\ 4\ x\ x\ x\ x\ x \\
n_8 &= x\ x\ 2\ x\ x\ x\ x\ x\ x \\
n_9 &= x\ 2\ x\ x\ 4\ x\ 2\ x\ x\ x \\
n_{10} &= 4\ x\ x\ x\ x\ 4\ x\ x\ x\ x
\end{align*}
\]

Problem 75. Define $f : \mathbb{N} \to \mathbb{Z}$ by

\[
f(x) = \begin{cases} 
\frac{x}{2} & \text{if } x \text{ is even, and} \\
\frac{1-x}{2} & \text{if } x \text{ is odd.}
\end{cases}
\]

Prove that $f$ is a bijection.